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STAAS & HALSEY LLP
700 11TH STREET, NW
SUITE 500
WASHINGTON, DC 20001

EXAMINER
THANGAVELU, KANDASAMY

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

	Application No.	Applicant(s)
Office Action Summary	09/268,999	ARITA, YUICHI
	Examiner	Art Unit
	Kandasamy Thangavelu	2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>04 March 2002</u> .

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-28</u> is/are pending in the application.

  4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-28</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

  Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

  If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

  a)☐ All b)☐ Some * c)☐ None of:

  1.☐ Certified copies of the priority documents have been received.

  2.☐ Certified copies of the priority documents have been received in Application No. _____ .

  3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
  application from the International Bureau (PCT Rule 17.2(a)).

  * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

  a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Introduction

1.   Claims 1 to 28 of the Application are pending.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3.   Claims 1-28 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for "work means model" to include "actual tool model" and "a hand model" as described on Page 26, Lines 18-22, of the specification, does not reasonably provide enablement for any other interpretation of the working means model. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims, if the "working means model" includes any other models. Furthermore, "means for" language in the specification only refers to other portions of the specification. Finally, although the specification recites the word "virtual", Applicant has only disclosed three-dimensional computer models.

4.   Claims 7 and 11 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to

make and/or use the invention. The rejections are based on the determination that the

specification does define workability and the workability coefficient and does not specify

how the workability and the workability coefficients are evaluated, but merely states that

the workability and workability coefficients are evaluated.

5.   Claims 1-28 are rejected under 35 U.S.C. 112, first paragraph, as containing

subject matter which was not described in the specification in such a way as to

reasonably convey to one skilled in the relevant art that the inventor(s), at the time the

application was filed, had possession of the claimed invention. These rejections are

based on the determination that the specification does not describe manipulator model,

manipulation requirements, manipulation model and arrangement of the manipulation

model.

Claim Interpretations

6.   The claims are interpreted using the following interpretations of the claim

language:

Working means model refers to the actual tool model and the hand model in a

three-dimensional CAD image as described in the specification, Page 26, Lines 18-22.

Virtual three-dimensional space has the *three-dimensional CAD images* of

components, standard parts, tools and hand and displays the assembly, disassembly

and other processes and are displayed on the computer monitor as specified on Page

59, Lines 10, 16 and 26.

Virtual tool model is the tool model in the three-dimensional CAD.

Claim Rejections - 35 USC § 102

7.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8.   Claims 1-6, 13-19, 22, and 24-28 are rejected under 35 U.S.C. 102(b) as being clearly

anticipated by **Sato et al. (SA)** (IEEE).

8.1   **SA** teaches a virtual object manipulation interface for automated assembly programming.

Specifically, **SA** teaches the CAD/CAM model of the design and the graphical models of the

components. (Page 1829, Col 1, Para 1). It is inherent that the component models include

standards part models arranged in the design model. So as per Claim 1, **SA** teaches a simulation

apparatus for simulating working of standards part models arranged in the design model. **SA**

teaches a design model designed in a virtual three-dimensional space. (Page 1826, Col 2, Para

2). **SA** teaches that one or more standard part models are arranged in the design model. (Page

1829, Col 1, Para 1).

       SA teaches that the CAD/CAM model of the design includes graphical models of virtual

parallel-jaw gripper. (Page 1829, Col 1, Para 1). **SA** also teaches CAD/CAM database used to

describe the components of the assembly and their relationship to one another. (Page 1827, Col

1, Para 2). So SA teaches a working means model information storage section for storing

information regarding a working means model related to one or more standard part models. SA

teaches a working means model information extraction section to extract information regarding a

working means model to be used to work the standard part models. (Page 1829, Col 1, Para 1).

SA teaches a working simulation execution section for executing a simulation of the working for

the standard part models with the working means model. (Page 1829, Col 1, Para 1).

8.2   SA teaches that the information required by the virtual assembly environment is primarily

graphical information consisting of component geometry; the geometry information is

parameterized by attributes. (Page 1828, Col 1, Para 2). So as per Claim 2, SA teaches that the

information regarding the standard part models includes attribute information of the working

means model related to the standard part models. SA teaches that the working means model

information extraction section refers to the working means model information storage section's

attribute information to extract the information regarding the working means model. (Page 1828,

Col 1, Para 2).

8.3   As per Claim 3, SA teaches the working means model information storage section stores

information of tool models of actual tools and/or a hand model of a hand of a worker.

(Page 1829, Col 1, Para 1).

8.4   SA teaches that the interaction with component models is provided through 6D mouse, which provides a means of tracking the position and orientation of the user's hand. (Page 1827, Col 2, Para 1). So as per Claim 4, SA also teaches the information regarding the working means model includes reference position information of the working means model when the working means model works the standard part models.

SA teaches that the process of mating two components or subassemblies into a single subassembly is described. (Page 1829, Col 1, Para 1). So it is inherent that SA teaches that the design information of the design model includes reference position information of the standard part models when the working means model works the standard part models.

SA teaches that one very important piece of information is available from CAD/CAM model assembly i.e. the final relative position and orientation of each component; it allows the system to correctly interpret the user's manipulation of components within virtual assembly environment. (Page 1828, Col 2, Para 2). It is inherent that SA teaches that the working simulation execution section performs simulation of a relationship in position/posture of the working means model to the standard part models based on the reference position information of the working means model and the standard part models.

8.5   SA teaches that to deal with generating a collision free robot joint angle trajectory, a global path planning algorithm is used. (Page 1831, Col 1, Para 3). It is inherent that as per Claim 5, SA teaches that the simulation apparatus has an interference checking section for checking interference of the working means model during simulation of the standard part models working with the working means model.

8.6.   SA teaches that to deal with generating a collision free robot joint angle trajectory, a

global path planning algorithm is used. (Page 1831, Col 1, Para 3). SA also teaches that the

three-dimensional path that the component must take is provided by the physical interaction of

the designer's hand with the graphical CAD/CAM models. (Page 1826, Col 2, Para 3).

So it is inherent that as per Claim 6, SA teaches that the interference checking section checks

interference of the working means model including a route along which the working means

model arrives at the standard part models when the standard part model is worked using the

working means model.

8.7   SA teaches manipulating the CAD/CAM model of the design and the graphical models of

the components to assemble them into an assembly. (Page 1829, Col 1, Para 1). It is inherent

that the component models include standards part models arranged in the design model. So as

per Claim 13, SA teaches a simulation method for simulating workability according to a working

means model used to work the standard part models arranged in the design model. (Page 1829,

Col 1, Para 1). SA teaches a design model displayed in a virtual three-dimensional space and

designed. (Page 1826, Col 2, Para 2).   SA teaches that one or more standard part models are

arranged in the design model. (Page 1829, Col 1, Para 1).

       SA teaches that simulation method includes relating a working means model to one or

more standard part models. (Page 1829, Col 1, Para 1).   SA teaches that the simulation method

includes acquiring the working means model related to the standard part models. (Page 1829,

Col 1, Para 1). SA teaches that the simulation method includes executing a simulation of

working to be performed for the standard part models using the working means model. (Page 1829, Col 1, Para 1).

SA teaches that the user of the system can see their hands in three-dimensional relationship with graphical CAD/CAM components of assembly and assemble them together. (Page 1826, Col 2, Para 2). So SA teaches that the simulation method includes displaying a process of the execution of the simulation in a virtual three-dimensional space.

8.8   SA teaches that the user of the system can see their hands in three-dimensional relationship with graphical CAD/CAM components of assembly and assemble them together. (Page 1826, Col 2, Para 2). So as per Claim 14, SA teaches that as the simulation of working to be performed for the standard part models, a simulation of at least one kind of working from among assembling working, disassembling working, adjustment working and maintenance working for the standard part models is performed.

8.9   SA teaches that grasping the components is performed by a virtual parallel-jaw gripper whose motion is controlled by the sensed motion of the user's hand. The user may also directly grasp the objects and manipulate them with hands. (Page 1829, Col 1, Para 1). So as per Claim 15, SA teaches that when a tool is used to work the standard part models, the tool and a hand of a worker who uses the tool are used as the working means model to perform the simulation. (Page 1829, Col 1, Para 1).

8.10   SA teaches that the user of the system can see their hands in three-dimensional

relationship with graphical CAD/CAM components of assembly and assemble them together.

(Page 1826, Col 2, Para 2). So as per Claim 16, SA teaches that when the standard part models

are to be worked by a hand of a worker itself, the hand of the worker is used as the working

means model to perform the simulation of the working.

8.11   SA teaches that the user of the system can see their hands in three-dimensional

relationship with graphical CAD/CAM components of assembly and assemble them together.

(Page 1826, Col 2, Para 2). So as per Claim 17, SA teaches that when the process of execution

of the simulation of the working is displayed in the virtual three-dimensional space, the working

means model is displayed in a shape suitable for an object of use in the virtual three-dimensional

space.

8.12   SA teaches that the user of the system can see their hands in three-dimensional

relationship with graphical CAD/CAM components of assembly and assemble them together.

(Page 1826, Col 2, Para 2). So as per Claim 18, SA teaches that when the process of execution

of the simulation of the working is displayed in the virtual three-dimensional space, the working

means model is displayed in a shape suitable for an object of use in the virtual three-dimensional

space.

8.13.   As per Claim 19, SA teaches that the process through which the working means model

arrives at one of the standard part models and a manner of working performed based on a

condition defined for the working means model are displayed as the process of execution of the

simulation. (Page 1826, Col 2, Para 2).

8.14   SA teaches that the assembly environment is centered around SPARC ZX graphics

workstation which is responsible for generating images of the CAD/CAM models of components

of assembly. (Page 1827, Col 1, Para 4). So as per Claim 22, SA teaches a computer-readable

recording medium having a simulation program to cause a computer to execute a simulation of

working with a working means model used to work the standard part models. SA teaches a

design model designed in a virtual three-dimensional space and designed. (Page 1826, Col 2,

Para 2).   SA teaches that one or more standard part models are arranged in the design model.

(Page 1829, Col 1, Para 1).

SA teaches that the simulation program causes the computer to implement a function of

acquiring information regarding a working means model related to one or more standard part

models. (Page 1829, Col 1, Para 1). SA teaches that the simulation program causes the

computer to implement a function of executing a simulation of working to be performed for the

standard part models based on the acquired information of the working means model. (Page

1829, Col 1, Para 1). SA teaches that the simulation program causes the computer to implement

a function of displaying a process of the execution of the simulation in a virtual

three-dimensional space. (Page 1826, Col 2, Para 2).

8.15   SA teaches that the interface allows the user to manipulate the three-dimensional

CAD/CAM models of components and assemble them into final product.. (Page 1826, Col 1,

Para 1). So as per Claim 24, it is inherent that **SA** teaches an apparatus for simulating model

manipulation having a main model with a manipulatable component model. It is also inherent

that **SA** teaches that the apparatus has a manipulator model capable of virtually manipulating the

manipulatable component model according to manipulation requirements of the manipulator

model. (Page 1826, Col 1, Para 1).

SA teaches that the sequential sets of three-dimensional paths for the components are

used as desired trajectories for the robot. (Page 1826, Col 2, Para 3). So it is inherent that **SA**

teaches that the apparatus has arrangement information describing an arrangement of the

manipulation model when manipulating the component model. It is also inherent that **SA** teaches

that the apparatus has a processing unit determining whether the arranged manipulation model

can virtually manipulate the component model by comparing the arrangement information and

manipulation requirements of the manipulation model to the main model.

8.16   **SA** teaches that to deal with generating a collision free robot joint angle trajectory, a

global path planning algorithm is used. (Page 1831, Col 1, Para 3). It is inherent that as per

Claim 25, **SA** teaches that the processing unit also determines whether the manipulation model

can be virtually moved to its arrangement without interference between the moving manipulation

model and the main model.

8.17   **SA** teaches that one very important piece of information is available from CAD/CAM

model assembly i.e. the final relative position and orientation of each component; it allows the

system to correctly interpret the user's manipulation of components within virtual assembly

environment. (Page 1828, Col 2, Para 2). It is inherent that as per Claim 26, **SA** teaches that the

orientation information is associated with the component model. **SA** teaches that to deal with

generating a collision free robot joint angle trajectory, a global path planning algorithm is used.

(Page 1831, Col 1, Para 3). It is inherent that **SA** teaches determining whether the manipulation

model can be virtually moved to its arrangement includes determining whether the manipulation

model can approach the component model according to the orientation information, without

interference from the main model.

8.18   **SA** teaches that the interface allows the user to manipulate the three-dimensional

CAD/CAM models of components and assemble them into final product.. (Page 1826, Col 1,

Para 1). So as per Claim 27, it is inherent that **SA** teaches a method for simulating model

manipulation including arranging a manipulation model into a manipulation arrangement,

according to an arrangement of a component model of a main model. It is also inherent that **SA**

teaches that the method for simulating model manipulation includes determining whether the

manipulation model in its manipulation arrangement can virtually manipulate the component

model, by comparing the main model to manipulation requirements of the manipulation model.

(Page 1826, Col 2, Para 3).

8.19   **SA** teaches that to deal with generating a collision free robot joint angle trajectory, a

global path planning algorithm is used. (Page 1831, Col 1, Para 3). It is inherent that as per

Claim 28, **SA** teaches that the method for simulating model manipulation including determining

whether said arranging can be performed without interference between the main model and the

manipulation model.

Claim Rejections - 35 USC § 103

9.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.

10.   The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459

(1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

     1.   Determining the scope and contents of the prior art.
     2.   Ascertaining the differences between the prior art and the claims at issue.
     3.   Resolving the level of ordinary skill in the pertinent art.
     4.   Considering objective evidence present in the application indicating obviousness
            or nonobviousness.

11.   Claims 7, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sato**

et al. (SA) (IEEE) in view of **Hirata et al. (HR)** (U.S. Patent 6,157,902).

11.1   As per Claim 7, **SA** teaches all the limitations but **SA** does not expressly teach that the

simulation apparatus has a workability evaluation coefficient storage section for storing a

workability evaluation coefficient of the working means model. **HR** teaches that the simulation

apparatus has a workability evaluation coefficient storage section for storing a workability

evaluation coefficient of the working means model.   (Col 2, Lines 12-15). It would have been

obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the

simulation apparatus of **SA** with the workability evaluation coefficient storage section of **HR** as

it would facilitate recoding the workability evaluation coefficient for analysis of workability and

developing better manipulation algorithms.

   SA does not expressly teach that the simulation apparatus has a workability evaluation

section for evaluating the workability based on a result of execution of the working simulation.

HR teaches that the simulation apparatus has a workability evaluation section for evaluating the

workability based on a result of execution of the working simulation.   (Col 2, Lines 12-15). It

would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to

modify the simulation apparatus of **SA** with the workability evaluation section of **HR** as it would

facilitate evaluating the workability evaluation coefficient for and storing it in the storage section

for later analysis of workability and developing better manipulation algorithms.

   SA does not expressly teach that the workability evaluation coefficient is stored in a

workability evaluation coefficient storage section. **HR** teaches that the workability evaluation

coefficient is stored in a workability evaluation coefficient storage section.   (Col 2, Lines 12-

15). It would have been obvious to one of ordinary skill in the art at the time of Applicant's

invention to modify the simulation apparatus of **SA** with the workability evaluation coefficient

storage feature of **HR** as it would facilitate later analysis of workability and developing better

manipulation algorithms.

11.2   As per Claim 20, **SA** teaches all the limitations but **SA** does not expressly teach that after

the working performed based on the condition defined for the working means model is

completed, a process through which the working means model is spaced away from the subject

position is displayed. **HR** teaches that after the working performed based on the condition

defined for the working means model is completed, a process through which the working means

model is spaced away from the subject position is displayed. (Col 3, Lines 5-6). It would have

been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the

method of **SA** with the method of **HR** to display the process through which the working means

model is spaced away from the subject position as it would enable the designer to observe the

working means withdrew from the assembled object without interference.

SA does not expressly teach that after the working means model is spaced by a

predefined distance away from the subject position, the display of the working means model and

the standard part models is erased. **HR** teaches that after the working means model is spaced by

a predefined distance away from the subject position, the display of the working means model

and the standard part models is erased. (Col 2, Lines 64-67). It would have been obvious to one

of ordinary skill in the art at the time of Applicant's invention to modify the method of **SA** with

the method of **HR** to erase the display of the working means model and the standard parts model,

as the simulation of the assembly work would be complete.

11.3   As per Claim 21, **SA** teaches all the limitations but **SA** does not expressly teach that

when interference occurs with the working means model in a process of execution of the

working to be performed for the standard part models with the working means model, an

occurrence condition of the interference is displayed. HR teaches that when interference occurs

with the working means model in a process of execution of the working to be performed for the

standard part models with the working means model, an occurrence condition of the interference

is displayed. (Col 2, Lines 53-56). It would have been obvious to one of ordinary skill in the art

at the time of Applicant's invention to modify the method of **SA** with the method of **HR** to

display the occurrence of interference, as it would facilitate the designer to identify the situation

when interference occurred and to modify his route for the working means in reaching the

standard parts and while withdrawing from the standard parts.

12.   Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sato et al.**

(SA) (IEEE) in view of **Doi et al. (DO)** (U.S. Patent 5,590,268).

12.1   As per Claim 8, **SA** teaches all the limitations but **SA** does not expressly teach that the

working means model information storage section stores information regarding a working

condition necessary for working as information regarding the working means model. **DO**

teaches that the working means model information storage section stores information regarding a

working condition necessary for working as information regarding the working means model.

(Col 5, Line 56 to Col 5, Line 3). It would have been obvious to one of ordinary skill in the art at

the time of Applicant's invention to modify the simulation apparatus of **SA** with the information

storage section storing information regarding a working condition of **DO** as it would facilitate

availability of working condition information for simulation of the assembly process.

SA does not expressly teach that the working simulation execution section executes simulation based on the information regarding the working condition of the working means model. **DO** teaches that the working simulation execution section executes simulation based on the information regarding the working condition of the working means model. (Col 2, Lines 12-15). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the simulation apparatus of **SA** with the simulation execution section of **DO** as it would facilitate using the working condition information in the simulation to achieve accurate simulation results regarding workability.

12.2   As per Claim 9, **SA** teaches all the limitations but **SA** does not expressly teach that the working means model information storage section stores information regarding working spaces necessary for working with the working means model as the information regarding the working conditions of the individual working means model. **DO** teaches that the working means model information storage section stores information regarding working spaces necessary for working with the working means model as the information regarding the working conditions of the individual working means model. (Col 5, Lines 2-11). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the simulation apparatus of **SA** with the information storage section storing information regarding working spaces of **DO** as the working space information would be available to evaluate the workability.

13.   Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sato et al. (SA)** (IEEE) in view of **Arita et al. (AR)** (U.S. Patent 6,205,367) further in view of **Hirata et al. (HR)** (U.S. Patent 6,157,902).

13.1   As per Claim 10, **SA** teaches all the limitations but **SA** does not expressly teach that the working means model information storage section stores information of a plurality of reference positions for any working means model. **AR** teaches that the working means model information storage section stores information of a plurality of reference positions for any working means model. (Col 2, Line 61 to Col 3, Line 3). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the simulation apparatus of **SA** with the information storage section storing information of a plurality of reference positions for any working means model of **AR,** as the information on the plurality of reference positions could be used to evaluate the workability with various positions of the working means.

SA does not expressly teach that the information of a plurality of reference positions for any working means model allows operation in a plurality of different methods. **HR** teaches that the information of a plurality of reference positions for any working means model allows operation in a plurality of different methods. (Col 3, Lines 9-12). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the simulation apparatus of **SA** with the information of a plurality of reference positions and operation in a plurality of different methods of **HR** as it would facilitate simulating using different operating modes and evaluating the workability for various modes.

SA does not expressly teach that the working simulation execution section executes simulation according to the plurality of operation methods. **HR** teaches that the working simulation execution section executes simulation according to the plurality of operation methods. (Col 3, Lines 9-12). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the simulation apparatus of **SA** with the information of a plurality of reference positions and operation in a plurality of different methods of **HR** as it would facilitate simulating using different operating modes and evaluating the workability for various modes.

13.2   As per Claim 11, **SA** teaches all the limitations but **SA** does not expressly teach that the working means model information storage section stores information of a plurality of reference positions for any working means model. **AR** teaches that the working means model information storage section stores information of a plurality of reference positions for any working means model. (Col 2, Line 61 to Col 3, Line 3). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the simulation apparatus of **SA** with the information storage section storing information of a plurality of reference positions of **AR,** as the information on plurality of working positions could be used to evaluate workability in various working conditions.

SA does not expressly teach that the information of a plurality of reference positions for any working means model allows operation in a plurality of different methods. **HR** teaches that the information of a plurality of reference positions for any working means model allows operation in a plurality of different methods. (Col 3, Lines 9-12). It would have been obvious to

one of ordinary skill in the art at the time of Applicant's invention to modify the simulation

apparatus of **SA** with the information of a plurality of reference positions and operation in a

plurality of different methods of **HR** as it would facilitate simulating using different operating

modes and evaluating the workability for various modes.

SA does not expressly teach that the working simulation execution section executes

simulation according to the plurality of operation methods. **HR** teaches that the working

simulation execution section executes simulation according to the plurality of operation methods.

(Col 3, Lines 9-12). It would have been obvious to one of ordinary skill in the art at the time of

Applicant's invention to modify the simulation apparatus of **SA** with the information of a

plurality of reference positions and operation in a plurality of different methods of **HR** as it

would facilitate simulating using different operating modes and evaluating the workability for

various modes.

SA does not expressly teach that the simulation apparatus has a workability evaluation

coefficient storage section that stores a workability evaluation coefficient for each of the

operation methods of the working means model. **HR** teaches that the simulation apparatus has a

workability evaluation coefficient storage section that stores a workability evaluation coefficient

for each of the operation methods of the working means model. (Col 2, Lines 12-15). It would

have been obvious to one of ordinary skill in the art at the time of Applicant's invention to

modify the simulation apparatus of **SA** with the workability evaluation coefficient storage

section storing a workability evaluation coefficient for each of the operation methods of **HR** as it

would facilitate recoding the workability evaluation coefficient for each of the operation methods

for analysis of workability and developing better manipulation algorithms.

SA does not expressly teach that the simulation apparatus has a workability evaluation section evaluates the workability of the working means model for the each of the working methods based on execution of the working simulation according to the working method. **HR** teaches that the simulation apparatus has a workability evaluation section evaluates the workability of the working means model for the each of the working methods based on execution of the working simulation according to the working method. (Col 2, Lines 12-15). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the simulation apparatus of **SA** with the workability evaluation section evaluating the workability of the working means model for the each of the working methods of **HR** as it would facilitate evaluating the workability evaluation coefficient for the each of the working methods and storing it in the storage section for later analysis of workability and developing better manipulation algorithms.

SA does not expressly teach that the workability evaluation coefficient stored for the operation method of the working means model in the workability evaluation coefficient storage section. **HR** teaches that the workability evaluation coefficient stored for the operation method of the working means model in the workability evaluation coefficient storage section. (Col 2, Lines 12-15). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the simulation apparatus of **SA** with the workability evaluation coefficient storage for the operation method feature of **HR,** as it would facilitate later analysis of workability for the operation method and developing better manipulation algorithms.

14.   Claims 12 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sato et al. (SA)** (IEEE) in view of **Carver et al. (CA)** (U.S. Patent 5,106,290).

14.1   As per Claim 12, **SA** teaches all the limitations but **SA** does not expressly teach a simulation apparatus in which at least one of a fastening part model, an adjustment part model and a connector part model is used for the standard part models. **CA** teaches a simulation apparatus in which at least one of a fastening part model, an adjustment part model and a connector part model is used for the standard part models. (Col 7, Lines 14-16 and Figure 6). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the simulation apparatus of **SA** with the fastening part model, adjustment part model and connector part model of **CA**, since different kinds of standard part models would then be available for simulation of the assembly and disassembly using three-dimensional images.

14.2   As per Claim 23, **SA** teaches all the limitations except as noted, including a designing supporting apparatus having a standard part model information storage section for storing information regarding one or more standard part models. (Page 1827, Col 2, Para 4).

SA teaches that the designing supporting apparatus has a designing supporting section for arranging one or more standard part models to perform supporting for designing a subject in a virtual three-dimensional space. (Page 1829, Col 1, Para 1). SA teaches that the designing supporting means includes an attribute information extraction section to extract attribute information of a working means model to be used to work the standard part models. (Page 1828, Col 1, Para 2).

SA does not expressly teach that the designing supporting means includes a design data outputting section for outputting data regarding the subject designed and data regarding the attribute information extracted by attribute information extraction section. CA teaches that the designing supporting means includes a design data outputting section for outputting data regarding the subject designed and data regarding the attribute information extracted by attribute information extraction section. (Col 11, Lines 11-14). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the designing supporting means of SA with the design data outputting section of CA, as it would facilitate outputting design data and attribute information for later analysis of the data and development better algorithms.

Response to Arguments

15.   Applicant's arguments, filed on 4 March, 2002 regarding art rejections have been considered and art rejections based on additional art have been included in this office action. Therefore, this office action is made non-final.
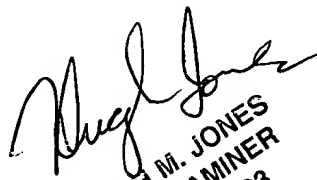
Conclusion

16.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kandasamy Thangavelu whose telephone number is 703-305-0043. The examiner can normally be reached on Monday through Friday from 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Kevin Teska, can be reached on (703) 305-9704. The fax phone number for

the organization where this application or proceeding is assigned is 703-746-7329.

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the receptionist whose telephone number is 703-305-

9600.

K. Thangavelu
Art Unit 2123
March 26, 2002